rotator assembly **48**. The remaining element of the external Faraday rotator assembly **48** comprises an annular glass substrate **68** having a central aperture **70** for passage of the rod-shaped magnet. A reflective coating layer **72** is formed at the top of the substrate **68**, rendering the combination of the substrate **68** and the reflective layer **72** a reverse mirror.

FIG. **6** is a cross-sectional view taken generally at line **6**—**6** of FIG. **5** and showing the single external triaxial Faraday rotator assembly **48** fixed to the surface **46**. Beams of light modes propagating through the converging pairs of cavity segments **74**, **76** **78**, and **80** at the mirror wells **58** and **60** respectively, are refracted upon entering the glass substrate **68**. As described with respect to the design of the external Faraday rotator assembly of the rhombic dodecahedron type, three factors, the thickness of the glass substrate, the index of refraction thereof and the degree to which the planar surface **46** is shaved or lowered from that of a frame employing intracavity Faraday assemblies are taken into consideration in designing the external assembly **48** so that the beams that enter the mirror wells converge upon common light contact points **82** and **84** at the surface of the reflective coating **72**.

The principles of operation and advantages of the external Faraday rotator assembly of FIGS. **5** and **6** are the same as those of the external assembly of FIGS. **2** and **3**. In both cases, the configurations offer, as advantages, not only the elimination of intracavity elements but also offer a greater degree of nonreciprocal splitting per unit of magnetic field (due to the double pass therethrough) while requiring only a single, as opposed to two, anti-reflective coating. The upper surface coating **72** is preferably semi-transmissive. This permits the mounting of output optics for all three axis upon the upper surface of the substrate **68**.

II. Cavity Length Control Mirror

FIG. **7** is an exploded perspective view of a cavity length control mirror **86** for mounting to one of the three "similar" surfaces **52**, **54** and **56** of the multioscillator frame **44**. (Similar refers to the shapes of the surfaces **52**, **54** and **56** and, more importantly, to the relative positionings of mirror wells within those surfaces.) Each of the planar surfaces **52**, **54** and **56** of the frame **44** is six-sided with a central mirror well **88** and a pair of de-centered mirror wells **90**, **92**, thus forming an equilateral triangle. At each of the three faces **52**, **54** and **56** the central mirror well **88** is located at the convergence of pairs of segments of a different one of the three intersecting nonplanar cavities.

FIG. **8** is a cross-sectional view of the cavity length control mirror **86** mounted to one of the faces **52**, **54** or **56** of the frame **44** taken at line **8**—**8** of FIG. **7**. The mirror **86** comprises a machined structure of low thermal coefficient of expansion material such as ZERODUR. The lower surface **94** includes a central depression or dimple **96**. Overlying the depression is a central post **98**. The reduced thickness web formed by the central depression **96** connects the central post **98** to an encircling annular ridge **100**. The bottom of the cavity length control mirror **86** comprises a reflective layer **102**, preferably a quarter-wave stack of silica-titania. For a regular tetrahedron, the reflective surface **102** is tuned for total reflection at a 39.2315 degree angle of incidence.

The diameter of the cavity length control mirror **86** is about 0.9 inches. As such, in the case of a frame **46** suitable for a 10 cm path length gyro, when the mirrored central depression **96** is mounted to overlie the central mirror well **88** of one of the similar planar faces **52**, **54** or **56**, the encircling mirrored annular ridge **100** simultaneously overlies the de-centered mirror wells **90** and **92**. Thus, the cavity length control mirror **86** provides two flat mirrors (at the

wells **90** and **92**) and a single curved mirror (at the well **88**). Accordingly, it addresses the requirement that at least one curved mirror and a pzt-controlled mirror must be associated with each of the three nonplanar gyro cavities. By mirroring the entire bottom surface of the device to obtain a "three-in-one" mirror per each surface **52**, **54** and **56**, rather than employing distinct, tiny mirrors, one is able to mount a web flexure of maximum size to the small frame **44**. This allows the cavity length control mirror **86** of the invention to overcome the problems associated with web stiffness that would otherwise occur in a system employing independent mirror mounts.

Thus, it is seen that the present invention provides teachings that enable one to realize the advantages of a multioscillator as taught by U.S. Pat. No. 4,795,258 in very small cavity length gyros. By employing the teachings of this invention, many highly desirable low accuracy applications may now be addressed by previously-unavailable configurations.

While this invention has been described with reference to its presently-preferred embodiment, it is not limited thereto. Rather, this invention is limited only insofar as it is described by the following set of patent claims and includes within its scope all equivalents thereof.

What is claimed is:

1. A ring laser gyroscope for measuring rotation about three orthogonal axes comprising, in combination:

a) a three-dimensional frame;

b) the exterior of said frame comprising a plurality of planar surfaces defining a rhombic dodecahedron;

c) three intersecting closed non-planar cavities within said frame;

d) each of said cavities comprising four straight segments of equal lengths that converge at planar surfaces of said frame;

e) straight segments of at least two cavities converging at at least one planar surface of said frame;

f) means for creating nonreciprocal splitting of modes in accordance with the Faraday effect being fixed to each of three planar surfaces of said frame; and

g) each of said means includes (i) a disk-shaped mirror substrate, said substrate having opposed upper and lower surfaces, and being fixed to a planar surface of said frame, (ii) said upper surface of said substrate being substantially totally reflective and (iii) a pill-shaped permanent magnet being fixed to the upper surface of and coaxial with said substrate.

2. A ring laser gyroscope as defined in claim **1** wherein said substrate is quartz.

3. A ring laser gyroscope as defined in claim **1** wherein each of said three means for creating nonreciprocal splitting is fixed to a planar surface of said frame at which terminal ends of segments comprising a single nonplanar cavity converge.

4. A ring laser gyroscope for measuring rotation about three orthogonal axes comprising, in combination:

a) a three-dimensional frame;

b) the exterior of said frame comprising fourteen planar surfaces defining a truncated regular octahedron or tetrahedron;

c) three intersecting closed non-planar cavities within said frame;

d) each of said cavities comprising four straight segments of equal lengths, said segments of said cavities being arranged so that ends of adjacent segments of each of